

Layers: An LQAS Application for the Collection, Entry and Analysis of Monitoring Data



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Food Aid Managers' Course

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Background: Why Layers?

- Originally developed to help USAID Missions fulfill their oversight responsibilities of PL-480, Title II Programs
- According to DCHA/FFP enabling regulation: “USAID Missions are expected to monitor CS's management of the commodities and use of grant funds (...) Oversight and monitoring should include regularly scheduled visits to distribution centers and warehouses...”
- Later expanded to other areas where USAID Missions have oversight responsibilities
 - Monitor availability of drugs and supplies in supported institutions
 - Monitor the Tiahrt Amendment on Family Planning
 - Etc.

System typically used to monitor commodity support programs:

- Partner acquire commodities and ship to inland distribution points
- Daily management of commodities (storage, distribution) is done by local partner representative
- Periodically, the site may be visited by USAID staff to verify for compliance with directives on proper storage and disposal of commodities.
- Monitors report on their visit to USAID upon return. If discrepancies with contract are noted, the partner may be notified.
- There is no systematic methodological guidance from USAID to direct Field Monitors in terms of sampling, indicators, etc.

Issues & options with current approach

ISSUES

- Only commodities targeted. Program activities not considered
- Selection of sites left to convenience. No systematic sampling of sites
- Only site visited assessed. No program wide monitoring.
- Designed for USAID's use only. No transparent feedback to partners

OPTIONS

- Take advantage of field visits to assess program activities
- Select sites randomly using systematic sampling
- Move from site-specific assessment to program wide monitoring
- Share feedback with partners to improve program performance.

Methodological Requirements

- Rapid, low cost sampling method
- Well defined indicators
- Simple data entry method
- Systematic data analysis routines
- Clear definition of all audiences

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LQAS: A simple, low cost random sampling methodology

- Originally developed in the 1920s to control the quality of output in industrial production processes
- Involves taking a small sample of a manufactured batch (lot) and test sampled items for quality.
- If the number of defective items in the sample exceeds a predetermined criteria (decision rule), then the lot is rejected.
- The sample size is statistically determined, based on desired production standards and on the corresponding decision rule
- The sample size is chosen so the manager has a high probability of accepting lots that meet the quality standards, and a high probability of rejecting lots that fail to meet those standards

Useful LQAS definitions

Standard LQAS theory

- Production standard:
 - % of items that must “pass” before the lot is accepted
-

- Production unit:
 - The machine or team that produced or assembled the lot
-

- Lot:
 - Total number of items produced in given time by the production unit
-

T-II programs

- Coverage
 - % of persons to be covered by the service (i.e. received food, or were vaccinated)
-

- Supervision unit
 - The CS, or program implementer that delivers the service
-

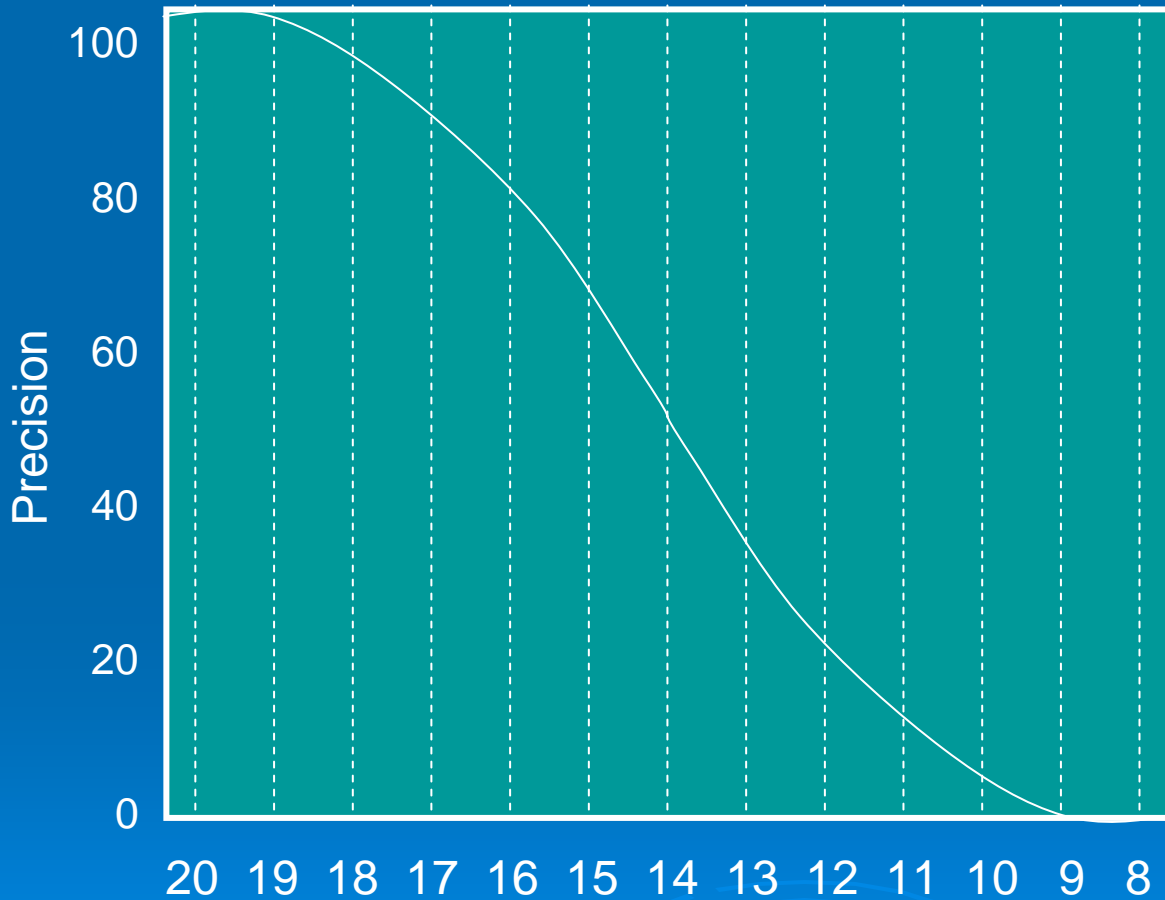
- Supervision area:
 - Total number of sites in a given zone delivering service (food, vaccines, etc)
-

Optimal LQAS Decision Rules for Sample Sizes of 12-24 and Coverage Benchmarks of 20%-95%

Alpha and Beta Errors $\leq 10\%$ for Decision Rules in Shaded Boxes

Coverage→ Sample↓	20 %	25 %	30 %	35 %	40 %	45 %	50 %	55 %	60 %	65 %	70 %	75 %	80 %	85 %	90 %	95 %
12	1	1	2	2	3	4	5	5	6	7	7	8	8	9	10	11
13	1	1	2	3	3	4	5	6	6	7	8	8	9	10	11	11
14	1	1	2	3	4	4	5	6	7	8	8	9	10	11	11	12
15	1	2	2	3	4	5	6	6	7	8	9	10	10	11	12	13
16	1	2	2	3	4	5	6	7	8	9	9	10	11	12	13	14
17	1	2	2	3	4	5	6	7	8	9	10	11	12	13	14	15
18	1	2	2	3	5	6	7	8	9	10	11	11	12	13	14	16
19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
20	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17
21	1	2	3	4	5	6	8	9	10	11	12	13	14	16	17	18
22	1	2	3	4	5	7	8	9	10	12	13	14	15	16	18	19
23	1	2	3	4	6	7	8	10	11	12	13	14	16	17	18	20
24	1	2	3	4	6	7	9	10	11	13	14	15	16	18	19	21

Why 19?



Little is added to the precision of the measure by using a sample larger than 19, notwithstanding the level of coverage being assessed.

Sample sizes less than 19, however, see a rapid deterioration in the precision of the measure. This is particularly problematic when coverage benchmarks vary.

A few last points

- For a universe (N) $>$ 500, the properties of binomial distributions are used to compute the sample size (n)
- For a universe (N) $>$ 500, the properties of hypergeometric distributions must be used to compute the sample size (n)
- The larger the N the closer the two methods. For small samples, the hypergeometric distribution is more accurate

Limitations of LQAS

- Only allows to tell whether a lot « passes » or « fails » on a pre-defined criteria¹
- Because the sample size is so reduced
 - The creation of sub groups and stratified analyses is impossible¹; and
 - Any reduction in the size of the sample (e.g. due to attrition or loss of cases) threatens its representativeness and makes the analysis more complex

¹*A moins de recueillir des échantillons supplémentaires dans 4 ZS ou plus*

Conclusion on LQAS as a method

- Low sample size needs (n=19 in most cases)
- Simple to apply yet very specific conclusions
- Result=High quality information at low costs

BUT

- Only dichotomous outcomes allowed
(pass/fail, complies/not complies, yes/no)
- Subsets are problematic

How to use in concrete situation

- Each partner program is defined as a SA
- Sampled units are the facilities where commodity is stored for later distribution (warehouses); or where the services are delivered (schools, health centers, orphanages, communities, etc)

Program activity sites by partner/ program area (hypothetical example)

<i>Partner</i>	<i>Central Warehouse</i>	<i>Health Centers</i>	<i>Schools</i>	<i>GR/OCF</i>	<i>Emerg'y/ FFW</i>	<i>TOTAL</i>
CRS	1	77	207	166	NA	451
CARE	1	35	103	NA	38	177
SCF	1	50	NA	NA	NA	51
WV	1	100	38	NA	NA	139
TOTAL	4	262	348	166	38	818

LQAS sampling scheme for all CSs by type of facility (N : n)

<i>Partner</i>	<i>Central Warehouse</i>	<i>Health Centers</i>	<i>Schools</i>	<i>GR/OCF</i>	<i>Emerg'y/ FFW</i>	<i>TOTAL</i>
CRS	1	77 : 19	207 : 19	166 : 19	NA	451 : 57
CARE	1	35 : 19	103 : 19	NA	38 : 19	177 : 57
SCF	1	50 : 19	NA	NA	NA	50 : 19
WV	1	100 : 19	38 : 19	NA	NA	139 : 38
TOTAL	4 : 4	262 : 76	347 : 57	166 : 19	38 : 19	818 : 171

Benchmarks are defined at 90% of performance, meaning that 90% of sites must perform adequately for the CS to meet expected performance standards.

LQAS sample size and decision rules for a performance standard of 90%

<i>Partner</i>	<i>Central Warehouse (No Decision Rule)</i>	<i>Health Centers</i>	<i>Schools</i>	<i>GR/OCF</i>	<i>Emergency/ FFW</i>
CRS	1	19 : 16	19 : 16	19 : 16	NA
CARE	1	19 : 16	19 : 16	NA	19 : 16
SCF	1	19 : 16	NA	NA	NA
WV	1	19 : 16	19 : 16	NA	NA

Methodological Requirements

- Rapid, low cost sampling method
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- Clear definition of all audiences

Application of LQAS to monitor USAID programs

- Layers can use LQAS to monitor all aspects of a program to guarantee the overall success of partner in delivering expected services:
 - proper management and storage of the commodities
 - activities (vaccination, food distribution, training)
 - service provider knowledge and capacity to deliver services
 - customer satisfaction surveys
 - behavior change among beneficiaries (health, nutrition, agriculture)
 - compliance with USAID regulations (EIA, Tiahrt)
 - Etc...

Example of performance indicators to measure

Layers can use LQAS to monitor all aspects of a program to ensure the overall success of partner in delivering expected services:

Management of commodities:

- Commodity movements
 - *Supplies adequate?*
 - *Ledger and physical inventory agree?*
 - *Tracking system in place?*
 - *Storage site appropriate, clean, ventilated?*

Health programs:

- Immunization services
 - *Cold chain OK?*
 - *Any stock outs on vaccines, drug supplies?*
 - *Any drugs and vaccine past due?*
- Nutrition intervention
 - *Staff knowledgeable?*
 - *Posters and materials present?*
 - *Scales calibrated?*

Education:

- Educational performance
 - *Is attendance up to expectations?*
- Teaching quality
 - *Are teachers present and adequately equipped?*
 - *Does the school infrastructure meet minimal standards?*
- Support systems
 - *Is water and sanitation adequate?*
 - *Is PTA present and active?*

FFW

- Roads
 - *Does road construction follow EIA standards?*
 - *etc*

Summary on indicators

- Wide array of indicators possible
- Degree of precision and detail left to the evaluator
- Performance benchmark (coverage) flexibly assigned, and can be a moving target
- If only 1 SA, only pass/fail statement can be made; if 4 or more SAs available, coverage estimates can also be derived by combining samples

Methodological Requirements

- Relatively homogenous CS programs
- Rapid, low cost sampling method
- Well defined indicators
- **Simple data entry method**
- Systematic data analysis routines
- Clear definition of all audiences

Simple data entry

- Large amounts of information generated: each round = 171 cases, each case +/- 100 questions, so more than 17,000 data points per round
- For analysis purposes, data must be digitized and cleaned before processing - this takes time
- Currently, questionnaire forms are filled in paper, not computerized.
- Layers automates all this in one single step using PDA devices and a specially designed data entry and retrieval application



FOOD AND
NUTRITION
TECHNICAL
ASSISTANCE

Form 1A:

**USAID Haiti:
Followup of CS Activities by Food
Monitors**

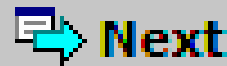
1A: Center Identification Information

Site Code

Date of Visit

Code Monitor

CS Working at the Site



FOOD AND
NUTRITION
TECHNICAL
ASSISTANCE

Form 1A:

**USAID Haiti
Followup of CS Activities
Monitors**

1A: Center Identification

Site Code ED2038

Date of Visit 2003-12-08

Code Monitor

CS Working at the Site CARE



**USAID Haiti:
Followup of CS Activities by Food
Monitors**

1A: Center Identification Information

Site Code

ED2038

Date of Visit

2003-12-08

Code Monitor

CS Working at the Site

CARE



Previous



Next



Finish



Locality

Latitude

CUSTOM POINT:
PPCC.GPS

Longitude

CUSTOM POINT:
PPCC.GPS

**Name of
Center**

**Type of Food
Distribution**

Type of Activity

Authorized Beneficiaries

Form 1B:

CS Name: [CARE]
Activity Type: [SF]
Locality: [GROS MORNE]
Name of Center: [ECOLE SAINT GABRIEL]

1B: Documentation/Commodities

- 1.1 Way Bill Available
- 1.2 Rations Table Available
- 1.3 Daily Report Available
- 1.4 Monthly Report Available

1B: Documentation/Commodities

- 1.1 Way Bill Available 0
- 1.2 Rations Table Available 0
- 1.3 Daily Report Available 0
- 1.4 Monthly Report Available 0
- 1.5 Sanctions Policy Doc Available 0

Number of Commodities at Site  

[Proceed to Commodity Selection](#)

1.

Select Commodity

How are units ()
being reported ?

1.6 Balance Remaining
from Last Delivery

1.7 Quantity Most
Recently Delivered

1.8 Total Amount
Available at Time of Visit

1.9A Amount
Distributed Since Last
Delivery

1. CSB

Select Commodity

- CSB
- Butteroil
- Cheese
- Corn
- Cornmeal
- CSB**
- CSM
- Lentils
- NFDM
- Peas

1.8 Total Amount

Available at Time of Visit

0

1.9A Amount

Distributed Since Last
Delivery



1.6 Balance Remaining
from Last Delivery

1.7 Quantity Most
Recently Delivered

1.8 Total Amount
Available at Time of Visit

1.9A Amount
Distributed Since Last
Delivery

1.9B Amount
Lost/Damaged

1.10 Remaining Amount of
According to Ledger



Previous



Next



Finish





1.10 Remaining Amount of
According to Ledger

140

1.11 Physical Inventory

130

1.12 Difference Between
Ledger and Physical
Inventory

10

Comments on this commodity?



Previous



Next



Finish



Comments on this commodity?

-
- [Go to Specific SF Questions](#)

**CSB Stocks:
Difference Between Ledger (140) and
Physical Inventory (130) is greater
than 5% (7.14%)**

Inventory

Comments on this commodity?

-
- [Go to Specific SF Questions](#)

Check of physical inventory and
ledger is OK for CSB



CS Name: [CARE]

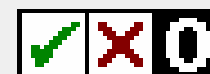
Activity Type: [SF]

Locality: [GROS MORNE]

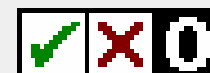
Name of Center: [ECOLE SAINT GABRIEL]

*Form X: (Applicable for Every Type
of Center): Monitoring of Storage
regulations*

X.1 Is food stored, elevated
from the ground ?



X.2 Is food stored a
minimum distance from the
wall ?



X.3 Are there signs of
rodents or infestation ?



Previous



Next



Finish



Recap: Data Entry Process

- 1) Go to site, fill in the questionnaire.
Repeat in each site
- 2) Return to headquarters and connect PDA to server
- 3) Data is automatically downloaded to server and made ready for analysis

Methodological Requirements

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Data analysis routine

- Analysis with LQAS is very simple:
 - Count number of “pass/fail” for each indicator
 - Apply decision rule in each case
 - Make judgment on overall quality of services

Making LQAS judgments on the overall quality of services offered

CS	MCHN Centers <i>Indicator: BCG in stock</i>		Schools <i>Indicator: Attendance >85%</i>	
	Sample: Decision Rule	Hypothetical Result: # Pass	Sample: Decision Rule	Hypothetical Result: # Pass
CRS	19 : 16	16	19 : 16	9
CARE	19 : 16	13	19 : 16	17
SCF	19 : 16	17	NA	---
WV	19 : 16	12	19 : 16	13

Example of report

➤ See handout



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Reporting to target audiences

- Primary audiences are: USAID, and the partners
- Audiences include also all entities that share responsibilities for the delivery of the services
 - MoH: Provision of vaccines, cold chain equipment, etc
 - MoE: Ensure teacher competence, pedagogical supplies
 - Other partners (e.g. CARITAS, etc)
- Identifying who is responsible for what, and making them accountable will help the CSs achieve expected results
- Frequency of reporting: every time a round is completed (Two rounds per year possible if $n = 171$ and 3 full time FM employed)

Other applications

- Used as pilot in Mid Term Evaluation (CRS Haiti)
- Used as pilot in Madagascar to monitor the quality of service delivery in the health sector (equipment, staff knowledge, beneficiary coverage and satisfaction)
- Used as pilot in Sudan (Darfur) to assess whether malnutrition rates were at or above particular trigger points (10%, 15%, 20%)

For more information...

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